DPS ABSTRACT
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Jupiter's Major Anti-Cyclonic Systems: A Galileo/NIMS Perspective

Galileo/NIMS acquired multi-spectral near-infrared (0.73 - 5.2 micron) maps of a number of large-scale anti-cyclonic systems since June,1996. These include the Great Red Spot, White Ovals BC, DE and the merged "BE" system, and a "little Red Spot" in the northern hemisphere. A wide range of atmospheric absorption strengths are covered by the 23 selected NIMS bandpasses used in these multispectral observations, - including weak, medium, and strong methane and hydrogen absorptions at 0.734, 0.898, 1.761, 2.042, 2.094, 2.168, and 2.375 micron - allowing NIMS to isolate in altitude prominent aspects of these features. Moreover, ammonia gas and ice opacity can be assessed by absorptions observed at 1.48, 1.99, 2.79, and 2.84 micron, which, when combined with the cloud structure results, enables the determination of the spatial variability of the mixing ratio of ammonia, thought to be the key cloud-forming condensable in Jupiter's upper troposphere above 1 bar.

Significant variability in aerosol color and single-scattering albedos are found between the high-altitude cores of cloudy anticylonic regions and their surrounding collars of low-opacity, low-level hazes. For example, adopting the red phase function of Tomasko et al (1978; Icarus 33, 558-592), the core of the Great Red Spot (GRS) exhibits high-opacity (>3.0) clouds extending to above the 300 mbar level with single scattering albedos near 0.997, 0.993, and 0.998 at 0.76, 0.95, and 1.6 micron, respectively. In contrast, the surrounding collar of low opacity (<1.00), low-lying (> 500 mbar) hazes are significantly darker, with single-scattering albedos near 0.90, 0.98, 0.96 at these wavelengths.

Cloudy turbulent regions to the northwest of the Great Red Spot (GRS) and between White Ovals BC and DE exhibit large spatial gradients in cloud heights and ammonia column abundances. Reflectivity in the 1.48-micron ammonia band varies by >50% in an anomalous cloud feature in the turbulent wake region (TW) to the northwest of the GRS and by > 300% in the inter-White-Oval region (IWO). This TW feature is relatively bright in methane, hydrogen and NH3 absorption passbands, indicating a relatively high altitude, yet exhibits unusually dark reflectivity at 2.73 micron, corresponding to a single scattering albedo < 0.91 compared to ~ 0.96 for a neighboring cloud; yet both clouds exhibit bright single-scattering albedos (> 0.993) at 0.76, 0.90, and 1.60 microns, comparable to the GRS itself. As suggested in our previous report (Baines et al., 1998, BAAS 22, 1070), this feature may be the result of unusually strong vertical transport of large particle size condensate material induced by the GRS's strong wake dynamics.